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It is the discussion of such difficult but crucial points that the reader seeks in vain in the final report. Passing in review the whole history of great earthquakes, it would seem remarkable, indeed, if the cause of one were not the cause of most, if not all, such movements of the crust. A criticism of the report, which has been made by several reviewers, is that it has ignored earlier work; and, excepting only the Mallet conception of isoseismals, it seems that the report might have been written in its present form if no report upon any earthquake had ever been published.

Repetition of a recent triangulation by the U.S. Coast and Geodetic Survey was made subsequent to the earthquake and revealed important changes in the location of monuments. The report upon this resurvey by Messrs. Hayford and Baldwin is of very great interest, since a comprehensive retriangulation after a destructive earthquake has been made before in but a single instance—that of the great Assam earthquake of 1897. No attempt can be made in the compass of this review even to mention the many important subjects which are treated in the report.

W. H. H.

University Geological Survey of Kansas. Vol. IX. Oil and Gas Report, 1908 [1909]. Pp. 600; pls. and maps, 110.

The Upper Carboniferous of Kansas, because of the abundant and beautifully preserved fossils which it furnishes; because of the thickness of its exposed section and the regularly alternating structure of limestones with shaly or sandy beds, and because of the distinguished and historic names which are associated with the literature that has grown up about it, has become in some measure a standard or reference section for invertebrate paleontologists when dealing with the Upper Carboniferous of the United States. Real additions to our knowledge of this series, therefore, will be of interest to all geologists and especially to those who are engaged in stratigraphic paleontology. The latest volume of the University Geological Survey of Kansas, however, contains matter for all tastes. It is divided into eleven chapters, each of which constitutes a more or less distinct paper dealing with the wide range of subjects which the geology of Kansas naturally presents. The first chapter comprises a geological and historical account of the discovery of oil and gas (pp. 5–41). It was written by Erasmus Haworth. The second and third chapters are jointly by Erasmus Haworth and John Bennett, and give the history of field work in Kansas (pp. 42–56) and a discussion of the general stratigraphy (pp. 57–160). The three succeeding chapters are by Erasmus Haworth and are entitled, respectively, "Detailed Geology of Oil and Gas" (pp. 161–79), "Life of Oil Wells and Gas Wells—Gas Pressure" (pp. 180–98), and "Chemical Conditions of Oil and Gas" (pp. 199–227). The second of these three chapters also includes an abstract of a paper by Dr. C. Engler on the "Origin of Petroleum" (pp. 198*a*–198*d*). Chap. vii, comprising pp. 228–302, was written by H. P. Cady and D. F. McFarland and deals with the chemical composition of gas, as the following chapter by F. W. Bushong deals with the chemical composition of petroleum (pp. 303–17). The title of the ninth chapter is "Coal-Measure Faunal Studies," by J. W. Beede and A. F. Rogers, and it comprises pp. 318–85. The last two articles were written by E. H. Sellards, who deals with "Fossil Plants of the Kansas Upper Paleozoic" (pp. 386–500), and "Fossil Cockroaches in the Kansas Coal Measures and Kansas Permian" (pp. 501–41).

The one of these papers which the writer's studies permit him to discuss most intelligently is that by Beede and Rogers on the Faunal divisions of the Kansas Coal Measures. This is a subject well worthy of investigation for if correlations are to be made with the Kansas section, it will probably be more with groups than with individual formations, some of which are only a few feet in thickness. Previous groupings of the formations had been suggested by authors, partly on considerations of stratigraphy, partly, as in Prosser's stages proposed for divisions in the upper portion of the section, on paleontologic evidence, but nothing which was as comprehensive and consistent involving the formations of the entire series and based on such an accumulation of data. In this connection it seems unfortunate that the classification and nomenclature of Beede and Rogers, resting it would appear especially on paleontological evidence, does not agree with that of Haworth and Bennett in the same volume, which appears to have sprung from considerations of lithology, topography, etc. Although I have myself studied the Kansas faunal sequence in a somewhat incidental and dilettante manner, I am not prepared with any criticism of the validity of the groups proposed. These will stand or fall as they meet the test of experience, but the authors certainly know the Kansas section better than any other paleontologists and there is no reason to doubt that their classification is, taken all in all, the best that has been proposed.

It seems rather doubtful, however, after reading their paper, whether the Kansas section can be used as a reference section with any degree of advantage. The authors find such variations in the faunas collected at different points in certain of the formations that were it not for their stratigraphic connection they would hardly be believed to be the same horizon. In my own work on the Kansas faunas similar anomalies were observed which led me to suspect the correctness with which the beds had been traced.

The generalization of the formational fauna by means of collections taken at numerous and widely separated stations does much to eliminate the false premise otherwise involved and doubtless the limit of error is still farther reduced by considering not the faunas of individual formations but of groups of formations. For this reason a grouping of the Kansas beds was especially desirable.

Some of the faunal modifications are regarded by the authors as the result of conditions of sedimentation, while others are ascribed to barriers, location and character not specified. Diversity of fauna at different points in the same bed of limestone can clearly not be ascribed to the interference of barriers nor probably can the fact that the shales with which the limestones alternate are usually almost barren of fossil shells, or at times contain invertebrate faunas of appreciably different facies from the adjacent beds of calcareous nature. Since now we have faunal variations, some of which can clearly be assigned to environmental causes, the propriety seems doubtful of explaining others by hypothetizing a different cause.

The classification proposed by Messrs. Beede and Rogers may be summarized as follows: The forty-six formations from the Cherokee shales below, to, and including the Neosho formation, to which limits the authors confine the Pennsylvanian, are divided into ten stages containing from one to nine formations each, and the stages are again grouped into four series, each of which contains two or three stages. The basis for this classification is presented in the form of two charts, one of which is of such novel construction that it requires the second as a key to it.

This table seems especially designed to show the abundance of species in the different formations, a fact to which the authors attach much importance, because they connect it with the ability to migrate. They say, "Another point of some significance which may be determined by the chart is the time at which migration of individual species is most apt to occur. It is well understood that the most vigorous species, represented by large numbers of individuals, are the ones that migrate most readily, other things being equal, and form the cosmopolitan elements of the various periods" (p. 327). And also below on the same page: "Other things being equal, it is believed that a species is more apt to withstand the vicissitudes of migration at this time [its culmination] than at any other on account of its greater numbers and reproductive ability and greater vitality." Now some of the fundamental facts in these statements seem doubtful to me. Are the species represented by large numbers necessarily the most vigorous? Are the most vigorous species the ones that migrate most readily, other things being equal? And are other things ever equal? As to the time of migration of any one species the case stands perhaps a little better. But even so, the migration of species is governed by so many factors extrinsic as well as intrinsic that inferences drawn from the fact of abundance can hardly lead to any trustworthy conclusions.

In short, it seems to me that the authors attach too much and possibly not altogether the correct significance to the fact of abundance. At all events, the matter is not so lightly to be disposed of.

Regarding their identification, the authors say that they have used conservatism: "Usually, where there is a question concerning the advisability of splitting up an older idea of a species, the old idea is followed here." As the paper is not accompanied by descriptions or figures, it is impossible for the reader to ascertain what breadth of specific limitation is assumed in any case. For my own part, it has always seemed to me that the relations between faunas are best shown when the discrimination of species is made with the keenest criticism, tempered with good judgment. It is to be hoped that in their final account of the fauna which the authors lead us to expect a refined discrimination of species will be employed.

The authors note some departures from the taxonomic nomenclature employed in previous papers which the present one in a way seems to summarize and be the fruit of, but the changes are hardly enough to bring the paper abreast of the time in this particular. These changes are, however, purely nomenclatural and do not necessarily affect the accuracy of the conclusions arrived at. They can the more be pardoned because the volume has been a long time in press and doubtless some of them came to the authors' attention after the report had left their hands.

The paper abounds in typographical errors, chiefly in connection with scientific names, and in other errors for which the printer cannot be blamed. One of the most serious, at least in the estimation of a paleontologist, is that the imprint is for the year 1908, while, as is apparent, the work really did not appear until late in 1909.[1] This, of course, cannot be laid at the door of Messrs. Beede and Rogers, nor perhaps the fact that the description of the chart begins on p. 359, while the chart is inserted thirty pages earlier, although in the description it is said to follow, thus really confusing the reader. Such errors, however, as ascribing *Seminula argentea* to Morton instead of Shepard, as citing a species of Leda under Nuculana and Leda, two genera which are recognized as being synonymous, and other similar instances, must be credited to the authors alone.

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[1] In his review of my report on the Guadalupian fauna (*Jour. Geol.*, XVII [1909], 672), Dr. Beede justly criticizes that book for the same fault. I take this occasion to put the facts on record. The pages were approved with the imprint 1908 on November 14 of that year. Under ordinary conditions this would have given ample time for publication before the end of the year, but owing to occurrences which could not be foreseen publication was delayed. The copies were received on January 29, 1909, and were immediately distributed so that the actual date of publication should probably be regarded as early in February.

It is doubtless illogical, but it is certainly true, that carelessness in such matters as these, in style and editorship—in brief, carelessness in form in which the work is presented—somehow leads the reader to infer carelessness in the work itself, an imputation which in the present case I do not believe to be deserved but which the authors might do well to guard against in the case of a less friendly critic.

G. H. G.

The Genesis of Loess a Problem in Plant Ecology. By B. SHIMEK. Iowa Academy of Science, pp. 57–64; date not given on separate, probably 1909. Pls. III–VII.

The Loess of the Paha and River-Ridge. By B. SHIMEK. Iowa Academy of Science, pp. 117–24, pls. VIII–XII.

These are critical papers full of important data assembled by a careful observer. They bring strong support to bear in favor of the eolian hypothesis of the loess. The first paper is also notable as an added recognition of the value of uniting the methods of two sciences in the study of composite problems.

T. C. C.

Aftonian Sands and Gravels in Western Iowa. By B. SHIMEK. Bulletin Geological Society of America, Vol. XX, 1909, pp. 399–408, pls. 33–37.

This important paper adds much new data to the distribution and constitution of the Aftonian formation and announces molluscan remains in addition to the mammalian fossils found recently by Calvin and the vegetal remains found earlier. These remains, taken with unconformities also described in this paper, made it clear that the Aftonian is a true interglacial deposit formed under mild climatic conditions and not simply a fluvial phase of the preceding or following ice-deposits.

In a supplementary note Shimek proposes the name Nebraskan for the Sub-Aftonian glacial formation because of what he deems objections to the previous terms Albertan and Jerseyan and an implied objection to the descriptive term Sub-Aftonian. But the facts (1) that the locality at which the formation was first found and its relations first pointed out is in Iowa, (2) that most of the localities now known are in Iowa, (3) that it has